

User Manual

Rev. 06

Applicable models: 15001K, 15002K

Applicable firmware version: 113-15001-061 or later

See page 2 for
tools needed

Before you start

- ① Check kit contents and part quantities/values by the photo at right and part list in page 2 and page 3. Report missing or wrong parts to your vendor.
- ② Resistor values are easy to mis-read. It is strongly suggested to check their values by ohm-meter before soldering them to board.
- ③ Make sure you understand the polarities and orientations of all parts.

Important !!!

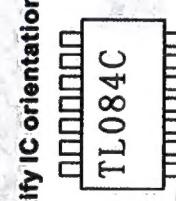
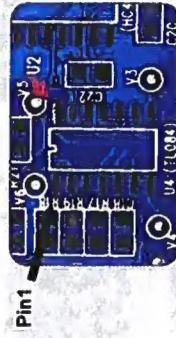
If you have purchased 15002K kit (SMD not pre-soldered) you must install all SMD parts before mounting the through-hole parts. Please refer to the instructions below for SMD part installation. Otherwise, proceed to page 2 to start through-hole part assembly.

SMD parts are only installed to the analog board (PCB PN# 109-15001-XXX).

How to Solder SMD Parts

1. Before soldering check components against the part list to make sure you have correct parts.
2. Identify IC orientation and diode polarity (see photos).
3. Do not put iron on one pad for too long time. Otherwise, traces may peel off and get damaged.

Solder ICs



Identify IC orientation



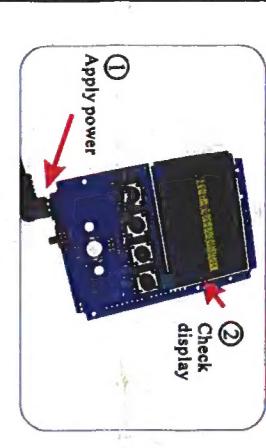
Important

If your kit does not have SMD device pre-soldered you are strongly suggested to install all SMD parts before mounting through-hole parts. Please see instructions at Page 1.

Step 1 Assembly the Main Board (follow the order as numbered)

1. Check the main board

- ① Before mounting any parts to the main board connect a 9V power supply (center positive) to 17 on the board to check the display.
- ② You should see the scope boots up to a screen similar to the photo below. D1 (LED) blinks twice. Do not solder any parts to the board if you find a problem. Otherwise warranty will be voided.



2. Test Signal Terminal



Note:
Before soldering bend the terminal to the shape as shown in the left photo above.

3. Power Connector (optional)



Note:
R30 is used to bypass SW5 so as the mainboard can be tested without the power switch. It must be removed for correct functioning of the power switch.

Now apply power again. Test power switch and tact buttons for their correct functions.

Tools you need

- ① 20 - 25W iron for most of parts. For the BNC connector higher power iron (50 - 100W) is recommended if available.
- ② Rosin solder wire (0.8 - 1mm dia.)
- ③ Digital multimeter
- ④ Screw driver (phillips, size # 0)
- ⑤ Flush cutter
- ⑥ Tweezers
- ⑦ DC 9V power supply with 200mA (or higher) current capacity and 5.5 x 2.1mm plug.
- ⑧ Needle-nose pliers
- ⑨ Small slotted screwdriver (2mm width, for cap trimmer adjustment)

Step 2 Assembly the Analog Board (follow the order as numbered)

1. Resistors

Note:
Always meter resistor values before soldering

□ R1	: 510K Ω	□ R7	: 300 Ω
□ R2	: 5.1M Ω	□ R8, R16	: 150 Ω
□ R3	: 1.2M Ω	□ R9	: 91 Ω
□ R4	: 11K Ω	□ R10	: 30 Ω
□ R5, R6, R14	: 1K Ω	□ R11, R12	: 15 Ω
□ R15	: 130 Ω	□ R13	: 3K Ω

2. Ceramic Capacitors

□ C1	: 0.1 μ F
□ C2	: 330pF
□ C4	: 1pF
□ C6	: 150pF

3. Slide switch

□ SW1	: 2P3T
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4. Electrolytic capacitors

□ C8, C10, C11	: 100 μ F / 16V
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5. BNC connector

□ J1	: BNC
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6. Pin-header (male)

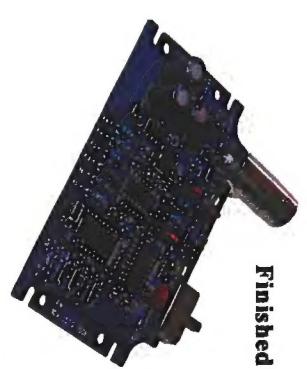
□ J2	: 2.2 X 5 pin, 2mm pitch
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Soldering Hints

- ① Put leads through mounting holes from the side with part outline. Ensure component evenly touch PCB.
- ② Solder leads at the other side. Solder should fully fill and cover soldering pads. Avoid bridges between neighboring pads.
- ③ Cut unused leads flush with cutter.



Finished

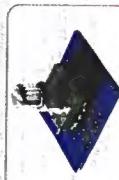


Step 3 Assembly Front Module

1. Solder Rotary Encoder

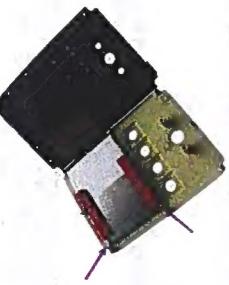
Mount to the small PCB
(PN: 108-15002-00A)

Note:
Please pay attention to the orientation of PCB. Use the side with outline marking.



2. Assemble Front Module

① Fit LCD to front panel as shown below.

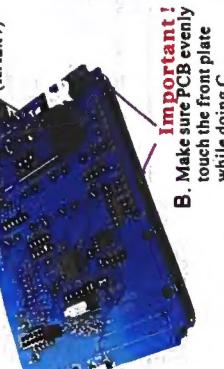


② Fold the main board over while keeping LCD in place.



③ Mount rotary encoder board to the front plate with screws and solder the board to J2 of the main board.

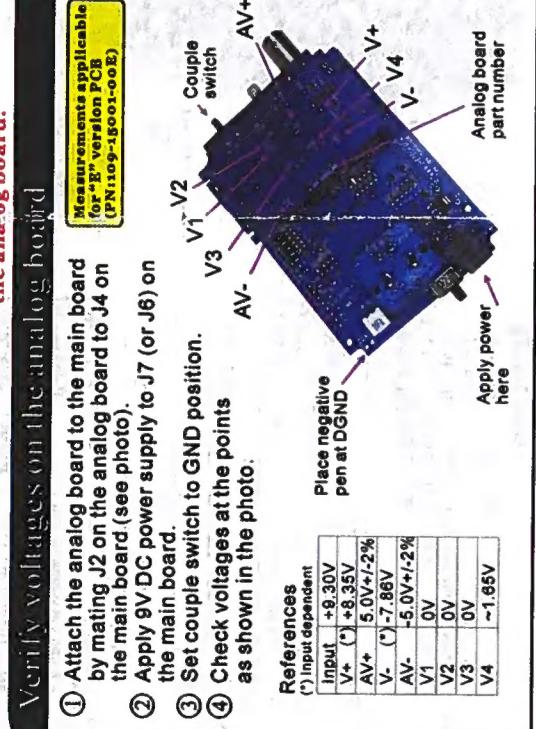
A. Mount with screws (KA2x4)
C. Solder here



Important!
B. Make sure PCB is evenly touch the front plate while doing C.

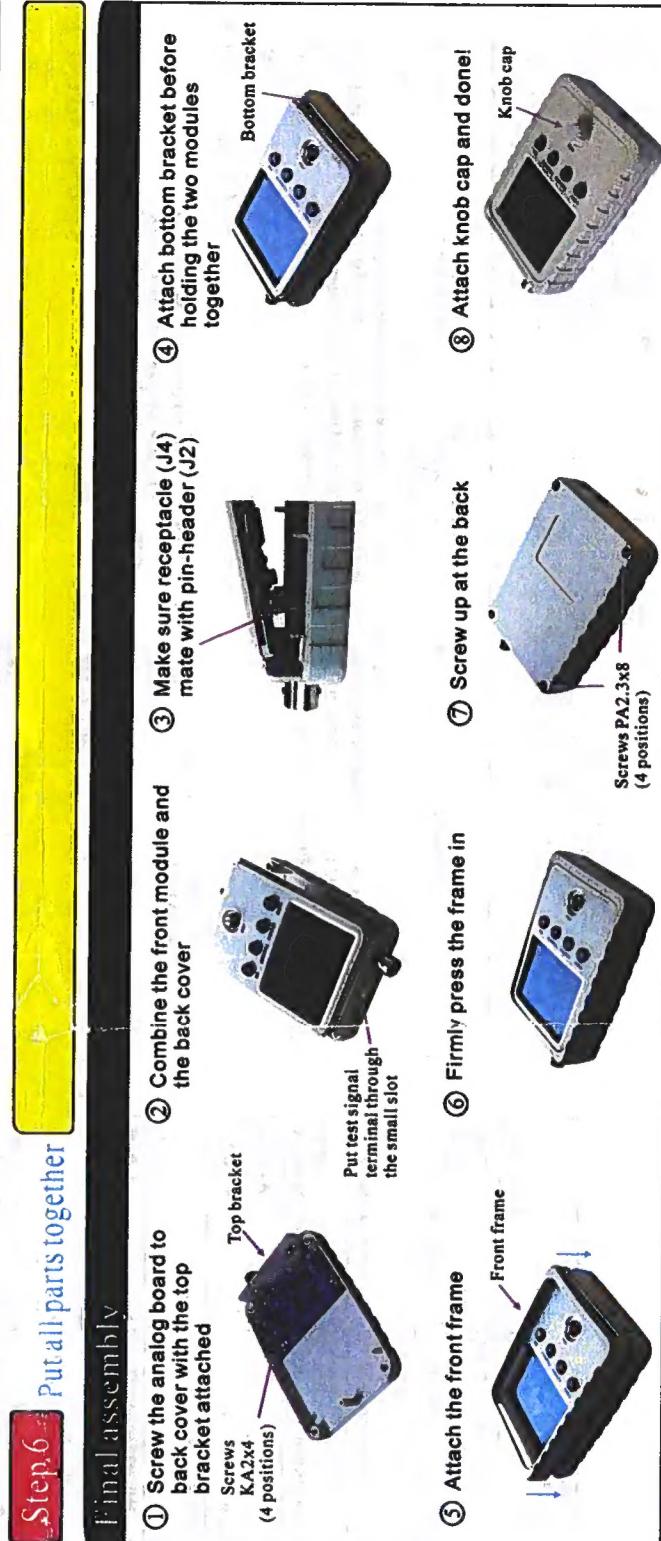
Step 4 Check Voltages

Important!
Always remove power before connecting or disconnecting the analog board.



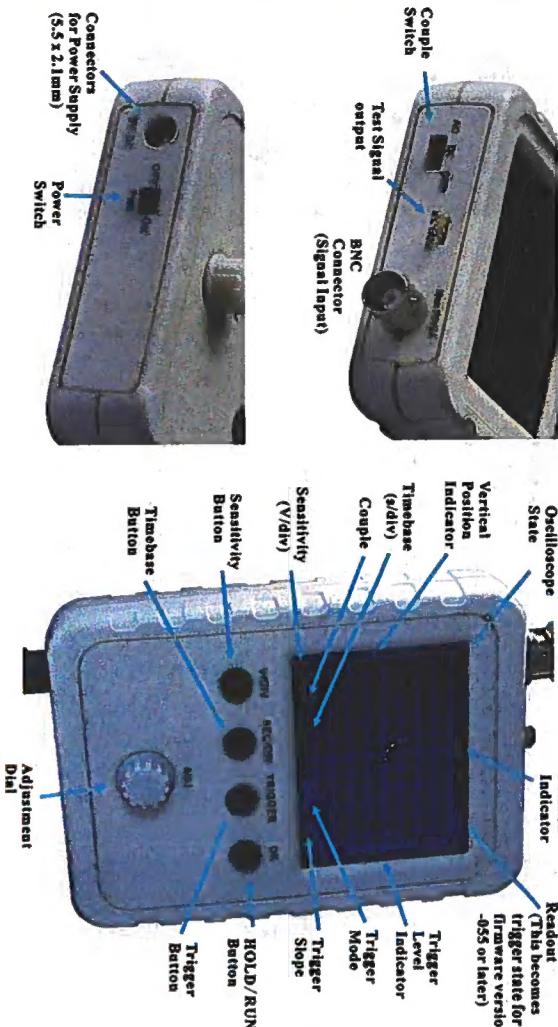
Step 5 Calibration

Tips:
Perform VPos alignment
before calibrating C3 and C5.



How to Use

Display and Controls



Connections

Power Supply: Connect 9V DC power supply to the 5.5x2.1mm jack at bottom (center positive). Power supply voltage must be in the range of 8 - 10V.

Probe: Connect probe to the BNC connector at top. Connect probe to the BNC connector at top.

Operations

Basic Button Functions

[V/DIV]: Select sensitivity or vertical position. The selected parameter indicator will be highlighted.

[SEC/DIV]: Select timebase or horizontal position. The selected parameter indicator will be highlighted.

[TRIGGER]: Select trigger mode, trigger level, and trigger edge. The selected parameter indicator will be highlighted.

[OK]: Enter HOLD state (freeze waveform). Press it again will de-freeze.

[ADJ]: Adjust the parameter selected (highlighted). Short press toggles Fast Adjustment mode.

Couple switch: Set couple to DC, AC, or GND. When GND is selected the scope input is isolated from input signal and connected to ground (0V input).

Attention

1. Power supply voltage must not exceed 10V. Otherwise it may damage the ICs inside.
2. Allowed maximum signal input voltage is 50Vpk (100Vpp) with the clip probe.

About Trigger State
The trigger can have three states including Holdoff, Waiting, and Triggered. They are explained below.
Holdoff: Trigger is disabled until a portion of sample buffer prior to a trigger point is filled with raw data.
Waiting: Trigger is waiting for a valid signal slope.
Triggered: A valid signal slope has been detected and registered.
Rolling Mode: When timebase is set to 50ms or slower and trigger mode is set to AUTO the scope will automatically switch to Rolling Mode where waveform shifts from right to left constantly. The trigger is disabled under this mode.

Troubleshooting

Specifications	
Max realtime sample rate	1MS/s
Analog bandwidth	0 ... 200KHz
Sensitivity range	5mV/div - 20V/div
Max input voltage	50Vpk (1X probe)
Input impedance	1M ohm/20pF
Resolution	12 bits
Record length	1024 points
Weight	100 gram (without probe and PS)

Functions	Operations
VPos Alignment	Set Couple Switch to GND position. Hold down [V/DIV] button for about 3 seconds.
Measurements	Hold down [OK] button for about 3 seconds. This will turn ON or OFF on-screen display of measurements including Vmax, Vmin, Vavr, Vpp, Vrms, Freq, Cycle, Pulse width, and Duty cycle.
ON/OFF	Press [ADJ]&[SEC/DIV] buttons simultaneously. The currently displayed waveform is saved to EEPROM. The existing data in EEPROM will be over-written.
Save Waveform	Press [ADJ]&[TRIGGER] buttons simultaneously. Recalled waveform is always displayed in Hold state.
Recall Waveform	Hold down [SEC/DIV] and [TRIGGER] buttons simultaneously for about 3 seconds.
Default Restore	Hold down [SEC/DIV] and [TRIGGER] buttons simultaneously for about 3 seconds.
Center HPos	Hold down [SEC/DIV] button for about 3 seconds. This will make the data at the center of capture buffer displayed.
Center Trigger	Hold down [TRIGGER] button for about 3 seconds. This will set the trigger level to the medium value of signal amplitude.
Center Level	Short press of [ADJ] toggles Fast Adjustment mode on and off for VPos, HPos, and Center Level.
Fast Adjustment	Short press of [ADJ] toggles Fast Adjustment mode on and off for VPos, HPos, and Center Level. A ">>" sign appearing at top of screen indicates Fast Adjustment is ON.